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Drug Abuse Warning Network, 2003: Area Profiles of Drug-Related Mortality

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
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HIGHLIGHTS

This is the first publication of mortality data from the new Drug Abuse Warning Network (DAWN). Virtually every feature of DAWN, except its name, changed in 2003. In this publication, we refer to "new DAWN" to emphasize these differences.

The purpose of this publication is to profile the drug-related deaths reported to DAWN by participating medical examiners and coroners (ME/Cs) for 2003. Each metropolitan area or State is presented separately, with participating and non-participating jurisdictions clearly identified. No system-wide summaries are provided, either in the text or in tables. Our intent is to discourage aggregation of data across areas, because the mortality component of DAWN is not national in scope nor can it be used to derive national estimates.

DAWN mortality data for 2003 are not comparable to those for any prior years. In fact, no comparisons of data from the "old" and "new" DAWN are possible. The key features of the new design are summarized below. A detailed discussion of the major design changes and a review of the content of the metropolitan-area and State profiles are provided in the chapter that follows these Highlights.

Jurisdictions participating in DAWN in 2003

For 2003, 122 jurisdictions in 35 metropolitan areas and 6 States submitted mortality data to DAWN (Table 1).[1] The States, which are all new to DAWN, are Maine, Maryland, New Hampshire, New Mexico, Utah, and Vermont. The 35 metropolitan areas range in size from Fargo, ND-MN (population 179,121), to New York-Newark-Edison, NY-NJ-PA (population 18,640,775). Vermont (population 619,107) is the smallest of the 6 States; Maryland (population 5,508,909) is the largest.

Among the areas, the response rate varied from 8% of jurisdictions in Louisville and Dallas-Fort Worth-Arlington to 100% in 9 metropolitan areas and the 6 States (Table 1). Population coverage exceeded 90% in 13 metropolitan areas. One of the goals of new DAWN is to include all death investigation jurisdictions within selected metropolitan areas and selected States. Since recruitment is ongoing, we caution readers to pay particular attention to which jurisdictions did and did not participate in DAWN in 2003. This information is a prominent feature of each of the area profiles in this publication. When we refer to metropolitan areas in these "Highlights," only participating jurisdictions are being considered.[2]

[1] For comparability across metropolitan areas, the four districts that make up Niagara County, NY, are counted as one jurisdiction.

[2] For convenience, shortened versions of metropolitan-area names are often used in the text (e.g., Dallas, in place of Dallas-Fort Worth-Arlington), except where this convention might itself lead to confusion.

Table 1

Participation of medical examiner/coroner jurisdictions in DAWN, 2003

Area	Total jurisdictions (counties)	Participating jurisdictions (counties)		Percent of population in participating jurisdictions
		Number	Percent of total	
Total metropolitan areas	**289**	**122**	**42%**	**64%**
Six states	**126**	**126**	**100%**	**100%**
Metropolitan areas				
Albuquerque, NM	4	4	100%	100%
Atlanta-Sandy Springs-Marietta, GA	28	4	14%	61%
Baltimore-Towson, MD	7	7	100%	100%
Birmingham-Hoover, AL	7	1	14%	61%
Boston-Cambridge-Quincy, MA-NH	7	7	100%	100%
Buffalo-Cheektowaga-Tonawanda, NY	2	2	100%	100%
Chicago-Naperville-Joliet, IL-IN-WI	14	5	36%	26%
Cleveland-Elyria-Mentor, OH	5	1	20%	64%
Dallas-Fort Worth-Arlington, TX	12	1	8%	11%
Denver-Aurora, CO	10	5	50%	96%
Detroit-Warren-Livonia, MI	6	4	67%	94%
Fargo, ND-MN	2	1	50%	71%
Houston-Baytown-Sugar Land, TX	10	4	40%	87%
Indianapolis, IN	10	2	20%	62%
Kansas City, MO-KS	15	3	20%	49%
Louisville, KY-IN	13	1	8%	59%
Miami-Fort Lauderdale-Miami Beach, FL	3	1	33%	44%
Milwaukee-Waukesha-West Allis, WI	4	1	25%	62%
Minneapolis-St. Paul-Bloomington, MN-WI	13	6	46%	57%
New Orleans-Metairie-Kenner, LA	7	3	43%	73%
New York-Newark-Edison, NY-NJ-PA	23	9	39%	57%
Ogden-Clearfield, UT	3	3	100%	100%
Oklahoma City, OK	7	1	14%	60%
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	11	6	55%	49%
Phoenix-Mesa-Scottsdale, AZ	2	1	50%	94%
Portland-Vancouver-Beaverton, OR-WA	7	3	43%	74%
Portland-South Portland, ME	3	3	100%	100%
Provo-Orem, UT	2	2	100%	100%
Salt Lake City, UT	3	3	100%	100%
San Diego-Carlsbad-San Marcos, CA	1	1	100%	100%
San Francisco-Oakland-Fremont, CA	5	2	40%	23%
Seattle-Tacoma-Bellevue, WA	3	2	67%	76%
Sioux Falls, SD	4	1	25%	78%
St. Louis, MO-IL	16	8	50%	84%
Washington-Arlington-Alexandria, DC-VA-MD-WV	20	14	70%	94%

Table 1 (continued)

Participation of medical examiner/coroner jurisdictions in DAWN, 2003

Area	Total jurisdictions (counties)	Participating jurisdictions (counties)		Percent of population in participating jurisdictions
		Number	Percent of total	
States				
Maine	16	16	100%	100%
Maryland	24	24	100%	100%
New Hampshire	10	10	100%	100%
New Mexico	33	33	100%	100%
Utah	29	29	100%	100%
Vermont	14	14	100%	100%

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2003 (9/2004 update).

Major features of new DAWN

Beginning in 2003, a DAWN case is any death related to recent drug use.

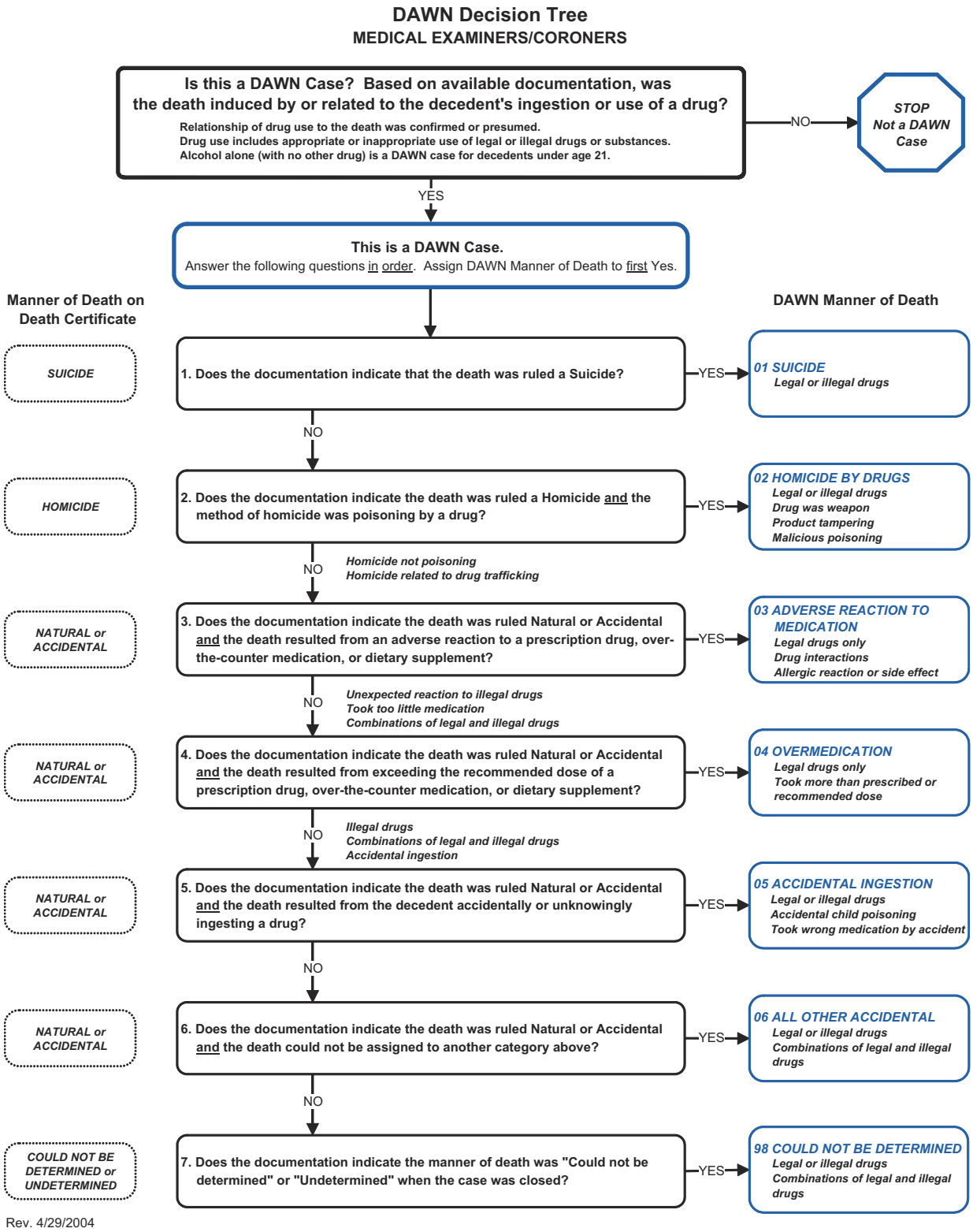
New DAWN includes deaths associated with substance abuse and drug misuse, both intentional and accidental. New DAWN also includes deaths related to the use of drugs for legitimate therapeutic purposes, although these are not discussed in this publication. None of the cases in new DAWN, not even the substance abuse cases, are comparable to DAWN cases from prior years.

In 2003, DAWN cases include deaths directly caused by drug use, misuse, or abuse, as well as deaths where the drug use, misuse, or abuse contributed to the death but did not cause it. Also included are deaths where a drug was simply implicated (presumed to be related to the death) and deaths where the drug's involvement was not well defined. Only recent drug use is considered, and the reason a decedent used the drug is irrelevant.

To standardize the heterogeneous mix of DAWN cases, each case is assigned to one of seven case types, hierarchically, as illustrated in Figure 1. The seven case types are:

- Suicide;
- Homicide by drug;
- Accidental ingestion;
- Adverse reaction;
- Overmedication;
- All other accidental; and
- Could not be determined.

Figure 1
DAWN decision tree



The assignment of these case types is based on the manner of death assigned by the ME/C and other criteria indicated in the decision tree. The final two case types, denoted *all other accidental* and *could not be determined*, are designed to capture all of the drug-related deaths that could not be classified in any of the prior case types. These are the case types designed to capture most drug abuse cases. *Could not be determined* cases include those that are ruled by the ME/C explicitly as "could not be determined" (i.e., the evidence was inconclusive with regard to whether the death was accidental, suicide, or homicide.)

Drug-related deaths covered in this publication

In this publication, we profile two categories of DAWN cases:

Suicide deaths with drug involvement, based on manner of death.

Drug misuse, defined broadly to include deaths related to drug misuse or abuse, based on the combination of 4 case types:

- Homicide by drugs;[3]
- Overmedication;
- All other accidental; and
- Could not be determined

A third category, which includes all case types and manners of death, is used only when profiling deaths involving illicit drugs. These drugs include:

- Cocaine;
- Heroin;
- Marijuana;
- Major stimulants, which include amphetamines and methamphetamine;
- Club drugs, which include MDMA (Ecstasy), GHB, flunitrazepam (Rohypnol), and ketamine;
- Hallucinogens, which include LSD, PCP, and other hallucinogenic substances such as psilocybin; and
- Non-pharmaceutical inhalants.

Only one unit of measurement—deaths—is used throughout this publication. To permit comparisons within or across areas or across demographic subgroups, death rates (i.e., the number of deaths per 1,000,000 population) have been added. This is important because two areas with similar numbers of drug-related deaths may have vastly different populations, and two areas with similar populations may have different numbers of drug-related deaths. Rates, which take population differences into account, permit standardized comparisons. Other measures should not be compared across areas.

Deaths associated with adverse reactions to medications taken for therapeutic purposes and accidental ingestions are not profiled in this publication.

[3] In 2003, few drug-related deaths reported to DAWN were classified as homicides, that is, homicides in which the weapon was a drug. Only 5 of the 32 metropolitan areas and none of the 6 States reported any drug-related homicides.

Among the 35 metropolitan areas, 32 reported more than 30 deaths related to drug misuse or abuse, and 13 of the 32 areas reported more than 30 drug-related suicide deaths. These "Highlights" consider only the 32 metropolitan areas (participating jurisdictions) and the 6 States (all jurisdictions).

Deaths related to drug misuse or abuse

Participating jurisdictions within the 32 metropolitan areas reported between 0 and 389 deaths related to drug misuse or abuse. Among the metropolitan areas, Baltimore (population 2,616,229) and Albuquerque (population 764,869) had rates of drug misuse deaths that exceeded 200 per 1,000,000 population (Table 2). Another 14 metropolitan areas had drug misuse death rates that exceeded 100 per 1,000,000.

Jurisdictions within the same metropolitan area often had widely varying rates of drug misuse deaths. Seven jurisdictions had rates of drug misuse deaths that exceeded 200 per 1,000,000 population. These were Baltimore City, MD; Denver County, CO; Bernalillo County, NM; Jefferson Parish, LA; St. Louis City, MO; the District of Columbia; and Manassas City, VA. Notably, St. Louis City had a rate 3.1 times the metropolitan-area rate; Manassas City and the District of Columbia had rates 3.8 times and 4.1 times the metropolitan-area rate, respectively.

In the 6 States, the number of deaths related to drug misuse or abuse ranged from 74 to 697. After adjusting for population differences, the rates of drug misuse/abuse deaths ranged from 88 deaths per 1,000,000 in Maine (population 1,305,728) and New Hampshire (population 1,287,687) to 162 deaths per million in New Mexico (population 1,874,614). However, the assignment of manner of death as "could not be determined" (CNBD), which affects the classification of deaths as suicide or misuse/abuse in DAWN, is of particular concern in Maryland and Utah. For Maryland, 93% of the drug-related deaths reported to DAWN were recorded as CNBD; for Utah, 75% of the drug-related deaths were recorded as CNBD.

Within the States, substantial variation was also evident across jurisdictions, and the highest rates were not always found in the urban centers. For example, the rate of drug misuse deaths in Piscataquis County, ME, (population 17,394) was 2.0 times the State average, and the rate of drug misuse deaths in Kane County, UT, (population 6,039) was 3.6 times the State average. This demonstrates the effect of even a few deaths in very small counties. Among the metropolitan areas, Ogden-Clearfield, UT, and Provo-Orem, UT, had rates below the average for Utah. The rate of drug misuse deaths exceeded the State averages in 4 other metropolitan areas: Baltimore (1.6 times the State average), Salt Lake City and Albuquerque (1.3 times), and Portland, ME (1.1 times).

Characteristics of decedents

Males are disproportionately represented among deaths related to drug misuse or abuse. In the average metropolitan area, males constituted 68% of drug misuse deaths reported to DAWN, ranging from 52% in Louisville to 77% in Phoenix. After adjusting for population size, the rate of drug misuse deaths per 1,000,000 population for males was 2.4 times that for females. The male-to-female difference was more than 3:1 in 5 of the 32 metropolitan areas: Cleveland, Miami, New Orleans, New York-Newark-Edison, and Phoenix. A similar pattern was observed in the 6 States where the male-to-female differences were at least 2:1 in 4 of the 6 States and more than 3:1 in Vermont.

Table 2

Drug-related deaths per 1,000,000 population, 2003

Area	Drug misuse deaths per 1,000,000 population	Drug-related suicide deaths per 1,000,000 population	Population covered by DAWN	Percent of population covered by DAWN	Total area population, 2003
Metropolitan areas					
Albuquerque, NM	204.0	23.5	764,869	100%	764,869
Atlanta-Sandy Springs-Marietta, GA	65.7	6.4	2,817,028	61%	4,610,032
Baltimore-Towson, MD	205.6	4.6	2,616,229	100%	2,616,229
Birmingham-Hoover, AL	135.2	10.6	658,141	61%	1,072,646
Boston-Cambridge-Quincy, MA-NH	109.5	14.2	4,439,971	100%	4,439,971
Buffalo-Cheektowaga-Tonawanda, NY	56.1	15.5	1,159,443	100%	1,159,443
Chicago-Naperville-Joliet, IL-IN-WI	57.0	14.0	2,419,985	26%	9,333,511
Cleveland-Elyria-Mentor, OH	130.5	15.4	1,363,888	64%	2,139,512
Denver-Aurora, CO	102.0	24.9	2,205,845	96%	2,301,116
Detroit-Warren-Livonia, MI	129.4	12.6	4,219,658	94%	4,483,853
Houston-Baytown-Sugar Land, TX	65.3	20.2	4,395,137	87%	5,075,733
Indianapolis, IN	73.0	8.1	986,507	62%	1,595,377
Kansas City, MO-KS	113.6	16.1	933,360	49%	1,904,908
Louisville, KY-IN	101.6	25.8	699,017	59%	1,190,154
Miami-Fort Lauderdale-Miami Beach, FL	67.9	8.1	2,341,167	44%	5,288,796
Milwaukee-Waukesha-West Allis, WI	143.6	20.4	933,221	62%	1,514,313
Minneapolis-St. Paul-Bloomington, MN-WI	53.3	15.9	1,763,421	57%	3,083,637
New Orleans-Metairie-Kenner, LA	188.3	18.6	966,307	73%	1,317,541
New York-Newark-Edison, NY-NJ-PA	93.4	5.5	10,665,839	57%	18,640,775
Ogden-Clearfield, UT	91.7	6.4	468,942	100%	468,942
Oklahoma City, OK	91.7	22.2	676,066	60%	1,132,652
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	103.8	28.1	2,811,906	49%	5,772,947
Phoenix-Mesa-Scottsdale, AZ	114.8	30.1	3,389,260	94%	3,593,408
Portland-Vancouver-Beaverton, OR-WA	96.4	17.8	1,514,744	74%	2,040,258
Portland-South Portland, ME	97.0	17.8	505,404	100%	505,404
Provo-Orem, UT	127.8	4.9	406,851	100%	406,851
Salt Lake City, UT	183.0	32.8	1,005,232	100%	1,005,232
San Diego-Carlsbad-San Marcos, CA	120.1	29.3	2,930,886	100%	2,930,886
San Francisco-Oakland-Fremont, CA	96.4	18.0	943,529	23%	4,157,377
Seattle-Tacoma-Bellevue, WA	91.2	17.9	2,400,820	76%	3,141,777
St. Louis, MO-IL	84.8	25.7	2,299,516	84%	2,735,927
Washington-Arlington-Alexandria, DC-VA-MD-WV	63.5	7.5	4,774,745	94%	5,057,414

Table 2 (continued)

Drug-related deaths per 1,000,000 population, 2003

Area	Drug misuse deaths per 1,000,000 population	Drug-related suicide deaths per 1,000,000 population	Population covered by DAWN	Percent of population covered by DAWN	Total area population, 2003
		States			
Maine	88.1	17.6	1,305,728	100%	1,305,728
Maryland	126.5	3.8	5,508,909	100%	5,508,909
New Hampshire	87.8	20.2	1,287,687	100%	1,287,687
New Mexico	161.6	19.2	1,874,614	100%	1,874,614
Utah	138.6	19.1	2,351,467	100%	2,351,467
Vermont	119.5	22.6	619,107	100%	619,107

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2003 (9/2004 update).

Drug misuse deaths among children and adolescents (age 6 to 20) were relatively infrequent, accounting for less than 4% of DAWN cases in 20 of the 32 metropolitan areas and greater than 10% in only 2 areas (Chicago and Miami). The rates for children and adolescents were lower than for any other age group in most of the metropolitan areas (28 of 32) and all of the 6 States.

Decedents age 35 to 54 accounted for more than half of the drug misuse deaths in 30 metropolitan areas and fell below half in only 2 metropolitan areas (Ogden-Clearfield and Provo-Orem, both in Utah). Three-quarters or more of the drug misuse deaths in Detroit, Milwaukee, and Washington, DC, involved individuals age 35 to 54. The fatality rate for this age group exceeded 400 deaths per 1,000,000 population in 3 metropolitan areas (Albuquerque, Baltimore, and Salt Lake City); the rate exceeded 300 per 1,000,000 in an additional 5 metropolitan areas and in 2 of the 6 States (New Mexico and Utah).

Although the rate of drug misuse deaths was typically highest in the 35 to 54 age group, there were a few exceptions. The fatality rate was higher in the 21 to 34 age group in the Ogden-Clearfield, UT; Philadelphia; and Portland-South Portland, ME, metropolitan areas and in the State of Maine. For ages 55 and older, the rate of drug misuse deaths averaged 44 deaths per 1,000,000 in the metropolitan areas and 48 per 1,000,000 in the States.

In 21 of the 32 metropolitan areas and 5 of the 6 States, more than half of the drug misuse deaths occurred at home. 2003 is the first time that DAWN has collected information about place of death.

Drugs involved in drug misuse or abuse deaths

The drugs most commonly involved in deaths related to drug misuse or abuse are summarized below:

	Most frequent		In the top 5	
Drug category	Metropolitan areas	States	Metropolitan areas	States
Cocaine	3	0	28	6
Opiates/opioids	29	6	32	6
Antidepressants	0	0	24	6
Alcohol	0	0	31	5
Benzodiazepines	0	0	29	5
Misc. anxiolytics, sedatives, and hypnotics	0	0	7	2

Illicit drugs

In the metropolitan areas, nearly half of drug misuse deaths, on average, involved a major substance of abuse (cocaine, heroin, marijuana, stimulants, club drugs, hallucinogens, or non-pharmaceutical inhalants). Across the 6 States, major substances were reported in about one-third of drug misuse deaths. Still, major substances were reported in 40% to 45% of drug misuse deaths in Maryland, New Mexico, and Utah.

Cocaine. Cocaine was the most frequently reported illicit drug. In drug misuse deaths, cocaine was among the top 5 drugs in 28 of the 32 metropolitan areas and all of the 6 States. On average, cocaine alone or in combination with other drugs was reported in 39% of drug misuse deaths (range 8% to 70%) in the metropolitan areas. About three-quarters of these deaths involved cocaine and at least one other drug. In the 6 States, cocaine was involved in 11% to 40% of drug misuse deaths, but often (range 72% to 98%) in combination with another drug(s).

Marijuana. Some jurisdictions do not conduct toxicology tests for the presence of marijuana and, therefore, do not report marijuana to DAWN. The full extent of this under-reporting of marijuana is unknown. Marijuana was never reported in 5 metropolitan areas and 1 State, and marijuana was reported in less than 5% of drug misuse deaths in 21 of the 32 metropolitan areas and 5 of the 6 States. Marijuana ranked among the top 5 drugs only in Indianapolis.

Stimulants. Stimulants, reported either as amphetamines or methamphetamine, appeared among the 5 most frequent drugs in 5 of the 32 metropolitan areas: Minneapolis; Ogden-Clearfield, UT; Phoenix; San Diego; and San Francisco. Stimulants also appeared among the 10 most common drugs in Albuquerque; Atlanta; Denver; Kansas City; Miami; New Orleans; Oklahoma City; Portland, OR; Provo-Orem, UT; Salt Lake City, UT; Seattle; and St. Louis. Similarly, stimulants were among the 10 most common drugs in New Mexico and Utah. This is consistent with known patterns of methamphetamine abuse, with the greatest concentrations appearing in the West, followed by diffusion into the Midwest and Southeast.

Club drugs. The DAWN area profiles include information on "club drugs" as a group that includes methylene dioxymethamphetamine (MDMA or Ecstasy), Ketamine, gamma hydroxy butyrate (GHB) and its precursor gamma butyrolactone (GBL), and flunitrazepam (Rohypnol). Club drugs were reported infrequently in 2003. Among the 32 metropolitan areas and 6 States, only 19 metropolitan areas and 3 States reported any deaths involving club drugs. The largest number (10) was reported in New York-Newark-Edison (the largest metropolitan area), followed by Miami (8). Club drugs were rarely reported alone. For example, none of the deaths reported in metropolitan New York or Miami involved only a single drug.

Hallucinogens. Deaths involving hallucinogens were also reported infrequently, with 21 of the 32 metropolitan areas reporting no such deaths. However, 5 or more deaths involving hallucinogens were reported in several metropolitan areas: Cleveland (7), Houston (5), Kansas City (7), New York-Newark-Edison (13), Philadelphia (10), and Washington, DC (8). Notably, hallucinogens alone were reported for 5 of the 7 deaths in Kansas City.

Other drugs

Alcohol. Alcohol was one of the 5 most common drugs in 30 of the 32 metropolitan areas and 5 of the 6 States. Since deaths involving alcohol alone are reported to DAWN only for decedents under age 21, this is only a partial picture of alcohol-related fatalities.

Opiates/opioids. In 29 of the 32 metropolitan areas and in all 6 States, more drug misuse deaths involved an opiate/opioid than any other drug. Moreover, many deaths involved multiple opiates/opioids.

Heroin or a metabolite specific to heroin was reported in more than one-third of opiate/opioid deaths in Albuquerque, Boston, Buffalo, Cleveland, Miami, and St. Louis. Morphine, which may be a metabolite of heroin or a pharmaceutical,[4] was reported in more than one-third of opiate/opioid deaths in Baltimore; Denver; Detroit; Indianapolis; Philadelphia; Phoenix; Portland, OR; Provo-Orem, UT; San Francisco; Washington, DC; and the State of Maryland. An unspecified or unnamed opiate [5] was reported in more than one-third of opiate/opioid deaths in Atlanta; Minneapolis; New York-Newark-Edison; Ogden-Clearfield, UT; and Salt Lake City.

The remaining named opiates/opioids include prescription pain relievers as well as methadone and buprenorphine, which are used to treat opiate addiction.

- Methadone was reported in more than one-quarter of deaths involving opiates/opioids in 12 of the 32 metropolitan areas and 3 of the 6 states. In DAWN data, it is not possible to distinguish methadone tablets, a prescription pain reliever, from the liquid methadone used to treat opiate addiction. Methadone was typically not the only drug involved in these deaths.
- Buprenorphine was implicated in no deaths reported to DAWN from participating areas in 2003.
- Hydrocodone was reported in more than one-quarter of deaths involving opiates/opioids in 4 of the 32 metropolitan areas (Birmingham, Houston, New Orleans, and San Francisco).

[4] The term "morphine" accounts for 98% of such reports.

[5] Unspecified opiates include the terms "opiates," "opioid," and "morphine derivative." The term "opiates" accounts for 99% of the unspecified opiates.

- Oxycodone was reported in more than one-quarter of deaths involving opiates/opioids in 4 of the 32 metropolitan areas (Kansas City, Milwaukee, Ogden-Clearfield, and Provo-Orem) and in 2 of the 6 States (Utah and Vermont).

Other prescription drugs. The 5 most common drugs in drug misuse deaths also included:

- Antidepressants (in 24 of the 32 metropolitan areas and all 6 States);
- Benzodiazepines (in 29 metropolitan areas and 5 of the 6 States); and
- Miscellaneous anxiolytics, sedatives, and hypnotics (in 7 of the 32 metropolitan areas and 2 of the 6 States).

Drug combinations in drug misuse deaths

DAWN accepts reports of illicit drugs, alcohol, prescription and over-the-counter pharmaceuticals, dietary supplements, and non-pharmaceutical inhalants. Multiple substances (as many as 6) can be reported for a single case. In 2003, the typical DAWN case involved between 2 and 3 drugs. Multiple drugs were as common in drug misuse deaths as in drug-related suicide cases; each averaged 2.7 drugs per case.

When multiple drugs are involved in a single case, the cause of death often cannot be attributed to any one substance. Instead, the cause may be attributed to "combined effects" of multiple drugs. To illustrate this important concept, the area profiles in this publication differentiate the number of deaths that involved only one drug (termed "single-drug" deaths) from all deaths. On average, participating metropolitan areas reported only 24% of drug misuse deaths (range 2% to 50%) and 19% of drug-related suicides (range 0% to 50%) with a single drug. Similarly, in the 6 States 24% of misuse deaths (range 7% to 35%) and 27% of drug-related suicides (range 10% to 57%) involved a single drug.

Combinations by drug category

Across the metropolitan areas, the most common single-drug deaths involved opiates/opioids alone, followed by cocaine and stimulants. The most frequent multiple-drug deaths involved various combinations of opiates/opioids, cocaine, and alcohol. In new DAWN, alcohol is reported in combination with other drugs and, for individuals under age 21, alcohol is reported even when no other drugs are present. Across the 32 metropolitan areas, the most common unique combinations were:

- Cocaine with opiates/opioids,
- Alcohol with opiates/opioids,
- Alcohol with cocaine and opiates/opioids, and
- Alcohol with cocaine.

In 5 of the 6 States, 2-drug combinations of alcohol with opiates/opioids outnumbered cocaine with opiates/opioids; New Hampshire was the exception. In New Hampshire, the most frequent combination was benzodiazepines with opiates/opioids.

Combinations within drug category

Combinations of opiates/opioids themselves are not uncommon. Across the 32 metropolitan areas, 16% of the deaths involving an opiate/opioid implicated heroin or its specific metabolites, while another 7% involved both morphine and codeine. The presence of both morphine and codeine is a possible indicator for heroin. In the 6 States, heroin was implicated specifically in 9% of the opiate/opioid deaths; an additional 9% involved both morphine and codeine. Methadone, hydrocodone, and oxycodone were reported frequently with other opiates/opioids. Considering the metropolitan areas, the opiate most frequently combined with hydrocodone was oxycodone, and vice versa. In the States, oxycodone was most frequently combined with methadone.

Drug-related suicide deaths

For 2003, the 32 metropolitan areas reported from 2 to 102 suicide deaths involving drugs. In general, rates of drug-related suicide were much lower than the rates for other types of drug misuse or abuse (Table 2). Only Phoenix (population 3,593,408) and Salt Lake City (population 1,005,232) had drug-related suicide rates that exceeded 30 per 1,000,000. An additional 9 metropolitan areas had suicide rates that exceeded 20 per 1,000,000. However, drug-related suicide deaths, in particular, may be confounded in some areas by frequent reporting of manner of death as "could not be determined" (CNBD). For example, over 90% of the drug-related deaths in Maryland were reported as CNBD.

Characteristics of decedents

Drug-related suicide deaths were more diverse than drug misuse deaths in terms of gender and age. These deaths involved females more often than males in 11 of the 32 metropolitan areas. In Louisville and Portland-South Portland, ME, the rate for females was more than twice that for males. Yet, in 4 metropolitan areas, the rates for males were more than double the rates for females. Females outnumbered males in drug-related suicides in 4 of the 6 States.

Drug-related suicide deaths involving children and adolescents (age 6 to 20) ranged from 0 to 14.6 per 1,000,000 population, with 15 metropolitan areas reporting no drug-related suicides in this age group. The highest rate of drug-related suicides for children and adolescents (14.6 deaths per 1,000,000) appeared in Oklahoma City, followed by Kansas City (7.2 per 1,000,000) and Philadelphia (6.1 per 1,000,000). The rates for children and adolescents were lower than for any other age group in all the metropolitan areas except Oklahoma City and in all of the 6 States. Two of the 6 States (Maine and Vermont) reported no drug-related suicide deaths involving children or adolescents age 6 to 20. The remaining 4 States each reported fewer than 3.

Decedents age 35 to 54 accounted for more than half of the drug-related suicide deaths in 19 of the 32 metropolitan areas. The fatality rate for this age group exceeded 50 deaths per 1,000,000 population in 2 metropolitan areas (Phoenix and St. Louis); the rate exceeded 60 per 1,000,000 in Salt Lake City.

Although the rate of drug-related suicide deaths was typically highest in the 35 to 54 age group, there were a few exceptions. The fatality rate was higher in the 21 to 34 age group in the Baltimore; Cleveland; Ogden-Clearfield, UT; and Philadelphia metropolitan areas. For ages 55 and older, the rate of drug-related suicide deaths averaged 18 deaths per 1,000,000 in the metropolitan areas and 19 per 1,000,000 in the States.

In 26 of the 32 metropolitan areas, more than 50% of the drug-related suicide deaths occurred at home. In the States, drug-related suicides occurred at home from 43% to 78% of the time.

Drugs involved in drug-related suicide deaths

The drugs most commonly involved in drug-related suicides are summarized below:

	Most frequent		In the top 5	
Drug category	Metropolitan areas	States	Metropolitan areas	States
Opiates/opioids	18	2	28	5
Antidepressants	10	4	25	6
Alcohol	1	0	29	5
Benzodiazepines	1	0	19	2
Misc. anxiolytics, sedatives, and hypnotics	0	0	17	3
Misc. analgesics/combinations	0	0	11	3

Illicit drugs. On average, less than 20% of drug-related suicides involved an illicit drug, such as cocaine or heroin. Recall, however, that marijuana is often not considered. Cocaine, in one-third of drug-related suicides, was reported more frequently in Boston than in any other metropolitan area. Stimulants, including amphetamines and methamphetamine, were reported most frequently (in nearly a quarter of the drug-related suicide deaths) in San Francisco.

Alcohol. Alcohol was one of the 5 most common drugs in all but 1 of the 32 metropolitan areas and 5 of the 6 States. Since deaths involving alcohol alone are reported to DAWN only for decedents under age 21, this is only a partial picture of alcohol involvement in drug-related suicides.

Opiates/opioids. In 18 of the 32 metropolitan areas and in 2 of the 6 States, opiates/opioids were the most common drugs reported in drug-related suicide deaths. As noted above, this category of drugs includes opiates such as heroin or morphine, opioid pain relievers such as oxycodone or hydrocodone, and nonspecific reports of "opiates."

Heroin or a metabolite specific to heroin was reported rarely in suicide-related deaths. In general, an unspecified opiate also was reported infrequently in drug-related suicide deaths. Morphine, which may be a metabolite of heroin or a pharmaceutical, was reported in one-quarter or more of suicides involving opiates/opioids in 9 metropolitan areas.

The remaining named opiates/opioids include prescription pain relievers as well as methadone and buprenorphine, which are used to treat opiate addiction.

- Methadone was reported in more than one-quarter of suicide deaths involving opiates/opioids in 4 of the 32 metropolitan areas and 2 of the 6 states. Methadone was typically not the only drug involved in these deaths. In DAWN data, it is not possible to distinguish methadone tablets, a prescription pain reliever, from the liquid methadone used to treat opiate addiction.

- Buprenorphine was implicated in no drug-related suicide deaths reported to DAWN from participating areas in 2003.
- Hydrocodone was reported in more than one-quarter of deaths involving opiates/opioids in 15 of the 32 metropolitan areas and 2 of the 6 states.
- Oxycodone was reported in more than one-quarter of deaths involving opiates/opioids in 14 of the 32 metropolitan areas and 4 of the 6 states.

Other prescription drugs. Antidepressants were frequently reported in drug-related suicides. It is not possible with these data to untangle the complex relationship of suicide to depression and depression to antidepressants. However, these data do show that most suicide deaths involving antidepressants also involved other drugs.

Drug combinations in drug-related suicide deaths

Combinations by drug category

The most common single-drug suicide deaths involved opiates/opioids alone, followed by antidepressants; cocaine; miscellaneous anxiolytics, sedatives, and hypnotics; and benzodiazepines.

However, more than 7 out of 10 suicide deaths involved more than one type of drug. The most frequent multiple-drug suicide deaths involved combinations of:

- Alcohol with antidepressants,
- Benzodiazepines with opiates/opioids,
- Alcohol with opiates/opioids, and
- Antidepressants with opiates/opioids.

Combinations within drug category

Suicide deaths involving opiates/opioids often involved a single one of these agents, and the single agents most frequently implicated were hydrocodone, oxycodone, and propoxyphene.

In the metropolitan areas, 13% of the deaths involving antidepressants involved antidepressants alone. In the States, 17% of the deaths involving antidepressants involved antidepressants alone. However, in the metropolitan areas and the States, a quarter of these deaths involved multiple antidepressants.

INTRODUCTION

The Drug Abuse Warning Network (DAWN) is a public health surveillance system that monitors drug-related deaths referred to medical examiners and coroners in selected metropolitan areas and States. DAWN also collects data on drug-related visits to hospital emergency departments from a national sample of hospitals. The Office of Applied Studies (OAS) of the Substance Abuse and Mental Health Services Administration (SAMHSA), U.S. Department of Health and Human Services, is responsible for DAWN.

Major changes to DAWN were introduced at the beginning of 2003. These changes are the result of a re-design that altered virtually every feature of DAWN, except its name. In this publication, we sometimes refer to "new DAWN" to emphasize its differences.

Since this is the first publication of mortality data from the new DAWN, it begins with a review of the design changes and explains their implications for understanding findings from new DAWN. This discussion of the new design is followed by a guide describing the content of each of the metropolitan-area and State profiles that form the core of this publication.

All findings in this publication reflect data on drug-related deaths that occurred during calendar year 2003 and were reviewed by a medical examiner or coroner. Since the mortality component of DAWN does not rely on a statistical sample of medical examiners or coroners, the findings cannot be extrapolated to apply to jurisdictions not participating during 2003. The findings cannot be extrapolated to the United States as a whole. Trends are not presented here because data for 2003 are not comparable to data for any prior year.

The re-design of DAWN

The re-design of DAWN began in 1997. An expert panel convened by SAMHSA/OAS was asked the most fundamental of questions: Should DAWN continue? The experts responded that DAWN should continue, but required major improvements.

The rationale for fundamental change was straightforward. While the population of the U.S. and its health care system changed dramatically over three decades, the DAWN protocol had remained essentially static. In particular, the cases included and data items collected by DAWN were unchanged and no longer fulfilled the needs of DAWN's users. This often led to misunderstandings about DAWN's design and its data, misinterpretation and criticism of its findings, and unfounded assumptions about whom and what DAWN represented.

SAMHSA/OAS initiated a 2-year evaluation of design alternatives that resulted in a set of recommendations for a new design.[6] The recommendations addressed virtually every feature of DAWN. Many of these features were field tested during the evaluation.

[6] Substance Abuse and Mental Health Services Administration, Office of Applied Studies. *Drug Abuse Warning Network: Development of a New Design (Methodology Report).* DAWN Series M-4, DHHS Publication No. (SMA) 02-3754, Rockville, MD, 2002. This publication is available online at http://DAWNinfo.samhsa.gov/.

A goal of the re-design was to make the morbidity (i.e., ED) and mortality components of DAWN more compatible. Therefore, most features of the new design were applied equally to the morbidity and mortality components of DAWN.

Implementation of the new design began in 2003, with no period of overlap between old and new DAWN. Table 3 provides a side-by-side comparison of DAWN's features before and after re-design.

Table 3

Comparison of major features, new DAWN versus old DAWN

New DAWN (began 2003)	Old DAWN (ended 2002)
Cases reported to DAWN	
All types of drug-related deaths investigated by medical examiners and coroners	Deaths related to drug abuse only
Simple case criteria: *Any death related to recent drug use*	Complex case criteria: Deaths related to drug abuse, defined as the use of an illicit drug or the non-medical use of a licit drug for one of the following purposes: ■ Suicide ■ Dependence ■ To achieve psychic effects
Current or recent drug use	Drug abuse at any time ■ Current or recent drug abuse ■ Past (history of) drug abuse
Decedent's intent is not considered	Decedent's intent to abuse a drug was key
8 manner of death categories assigned hierarchically: ■ Suicide ■ Homicide by drugs ■ Adverse reaction to medication ■ Overmedication ■ Accidental ingestion ■ All other accidental ■ Could not be determined	5 manner of death categories: ■ Accidental/unexpected ■ Suicide ■ Homicide ■ Undetermined ■ Natural
Decedents of any age	Decedents age 6 to 97
Drugs reported to DAWN	
Only those drugs that caused or contributed to the death	Any drug
All types of drugs: ■ Illicit drugs ■ Prescription and over-the-counter medications ■ Dietary supplements ■ Non-pharmaceutical inhalants	Same
Maximum of 6 drugs, plus alcohol	Same
"Alcohol-in-combination" reportable for any case; "Alcohol only" for patients age < 21	"Alcohol-in-combination" only
Current medications unrelated to the death are not reportable	Current medications reportable, even when unrelated to the death
Other data items	
Whether each drug was confirmed by toxicology	Laboratory findings

Table 3 (continued)

Comparison of major features, new DAWN versus old DAWN

New DAWN (began 2003)	Old DAWN (ended 2002)
Cause of death: ■ Immediate cause ■ Other causes ■ Other significant conditions	Cause of death: ■ Drug-induced: drug(s) directly caused the death ■ Drug-related: drug(s) contributed to the death – Drug abuse in combination with physiological condition – Drug abuse in combination with external physical event – Drug abuse-caused medical disorder (whether abuse past or present) ■ If drug-related: – Confirmed – Presumed
Drug involvement in death: ■ Drug-induced: drug(s) directly caused the death ■ Drug-related: drug(s) contributed to the death – Confirmed – Presumed	See cause of death (above)
6 categories for route of administration	7 categories for route of administration
Other changes	
Case finding by retrospective review of decedent case file for all deaths processed by ME/C jurisdiction	Mix of case review and screening methods
Rigorous reporter training and quality assurance	Limited oversight
Performance feedback to ME/Cs and reporters	Limited feedback
Representation	
No national estimates	Same
Jurisdictions in selected metropolitan areas and States	Jurisdictions in selected metropolitan areas
Eligible jurisdictions: ■ Every jurisdiction in a metropolitan area represented in the DAWN emergency department component ■ Every jurisdiction in selected States with centralized ME/C systems	Any participant
Metropolitan areas updated to reflect boundaries based on 2000 Census	Metropolitan area boundaries from multiple periods
Deaths referred for ME/C review vary according to prevailing State law	Same

SOURCE: Office of Applied Studies, SAMHSA, Drug Abuse Warning Network, 2004.

Major features of the new design

What is a DAWN case?

One of the most important features of the new DAWN is its expansive definition of a case:

A DAWN case is any death related to recent drug use.

To be a DAWN case, the relationship between the death and the drug need not be causal; the drug needs only to be implicated in the death.

The case criteria are intended to be broad and inclusive and to have few exceptions. DAWN cases are found through a retrospective review of decedent case files in each participating death investigation jurisdiction.[7] Broad criteria take into account the fact that documentation may vary in clarity and comprehensiveness across jurisdictions and among medical examiners and coroners. Broad criteria minimize the potential for judgments that could cause data to vary systematically and unexpectedly across reporters and jurisdictions. In addition, broad criteria are designed to capture a very diverse set of drug-related cases, which can be aggregated and disaggregated to serve a variety of analytical purposes and the interests of multiple audiences.

DAWN cases include deaths associated with substance abuse, but also include drug misuse, intentional or accidental, as well as deaths related to the use of drugs for legitimate therapeutic purposes.

Beginning in 2003, DAWN cases also include:

- Deaths involving alcohol as the only drug for decedents under the age of 21.

There are some clearly delineated exceptions to the DAWN case criteria. A death is *not* a DAWN case if:

- There was no evidence of recent drug use.
- The death was not processed by a medical examiner or coroner.[8]
- The decedent was a drug user, but died of natural causes unrelated to the drug use.
- The decedent was a homicide victim but the method of homicide was not poisoning by drugs.
- The decedent consumed a non-pharmaceutical substance but did not inhale it.
- The death involved inhalation of carbon monoxide and no other reportable substance.
- The decedent had a history of drug use but no recent use.
- Alcohol was the only substance involved and the decedent was an adult (age 21 or over).
- The only documentation of drug involvement was in toxicology test results.
- The only drugs listed (e.g., current medications) were not related to the death.
- The death was a consequence of undermedication, i.e., taking too little of a drug.

[7] This review is conducted by data collectors called "DAWN reporters."

[8] Overall, only a fraction of total deaths are referred to a medical examiner or coroner.

The case criteria adopted for new DAWN solve many problems inherent in the criteria used previously. From 1972 to 2002, a DAWN case was defined as a death related to drug abuse, and drug abuse was determined by the decedent's intent. That is, a death was a DAWN case if the individual's reason for taking the drug was dependence, suicide, or to achieve psychic effects. DAWN cases could involve the use of an illegal drug, the non-medical use of a legal one, or the inhalation of a non-pharmaceutical substance. Deaths were excluded, regardless of the drug involved, if the "intent to abuse" was absent.

Certainty with regard to a patient's intention is frequently not evident in death investigation records. Therefore, identification of drug abuse cases based on positive or explicit indicators is sometimes impossible and certainly varies systematically across jurisdictions and among medical examiners and coroners. Further, the lack of clear and objective distinctions between use, misuse, and abuse also influence documentation in ways that are probably systematic but indiscernible. As a result, if the case criteria based on intent were strictly applied, cases involving use or misuse of a drug would be lost when the source record lacked explicit documentation of abuse as defined by DAWN. Thereby, drug-related deaths of interest to DAWN users were excluded. If the criteria were applied improperly or inconsistently (a more likely scenario), the resulting data would be systematically flawed. Moreover, the resulting cases included deaths from a mix of acute and chronic conditions, based on drug use that occurred minutes, hours, or years before the death occurred.

The new case criteria solve all of these problems. In new DAWN, only recent drug use is included; the reason an individual used a drug is irrelevant; and the criteria are broad enough to encompass all types of drug-related events, including, but not limited to, explicit drug abuse.

Types of cases in new DAWN

The comprehensive new case criteria yield a diverse set of cases in new DAWN. To bring order to the diverse mix, each case is assigned to one of seven case types, which may be analyzed separately or in purposeful combinations. These case types utilize, but do not duplicate, the manner of death assigned to the case by the ME/C. The seven case types and their relationship to manner of death are shown below:

DAWN case type	Manner of death on death certificate
Suicide	Suicide
Homicide by drug(s)	Homicide
Adverse reaction to medication	Natural or accidental
Overmedication	Natural or accidental
Accidental ingestion	Natural or accidental
All other accidental	Natural or accidental
Could not be determined	Could not be determined or undetermined

Each DAWN case is assigned systematically and hierarchically into one and only one case type, based on a series of questions and rules. To assign case type, DAWN reporters use a decision tree, a graphical depiction of the logic of the case type assignment rules (Figure 1). Cases are classified into the first case type that applies. Even if a case might fit into more than one type, it is assigned to the first one that applies. The case types were ordered with this in mind.

The case types *all other accidental* and *could not be determined* are reserved for DAWN cases that do not meet the rules for classification into any of the prior five types. These residual cases are assigned based on the manner of death assigned by the ME/C.

What drugs are included in new DAWN?

DAWN includes all types of drugs. Drugs eligible for DAWN include:

- Illegal drugs, such as heroin, cocaine, marijuana, and Ecstasy;
- Prescription drugs, such as Prozac®, Vicodin®, OxyContin®, alprazolam, and methylphenidate;
- Over-the-counter (OTC) medications, including aspirin, acetaminophen, ibuprofen, and multi-ingredient cough and cold remedies;
- Dietary supplements, including vitamins, herbal remedies, and nutritional products;
- Psychoactive, non-pharmaceutical inhalants;
- Alcohol in combination with other drugs; and
- Alcohol alone, in decedents age less than 21 years.

To be reportable, a non-pharmaceutical substance must be consumed by inhalation, sniffing, or snorting, and must have a psychoactive effect when inhaled. A death involving inhalation of a non-pharmaceutical, psychoactive substance and no other drug qualifies as a DAWN case. Carbon monoxide is excluded from the inhalants reportable to DAWN.

Other improvements in new DAWN

Many other changes were implemented to improve the quality and reliability of DAWN data. These include:

- Case finding by a retrospective review of the entire case file for deaths investigated by ME/Cs;
- Conversion from paper to electronic reporting with automated prompts and data validation;
- Addition of data items for causes of death and place of death to more adequately characterize the nature of drug-related deaths (Appendix A);
- Elimination of incidental drug reporting to the extent possible;
- Emphasis on accurate, specific, and non-redundant drug reporting;
- Addition of data items to identify drugs confirmed by laboratory testing;
- Systematic training and certification of DAWN reporters; and
- In-house review and cleaning of DAWN case reports.

All of these improvements have corresponding improvements in the ED morbidity data.[9] One improvement unique to the mortality data is the year-end review by the ME/Cs themselves. After the data for 2003 were closed out, each ME/C received a summary of the drug-related deaths submitted for each of his or her jurisdiction(s). This final step provided an opportunity for the ME/Cs to approve or reject the data used for this publication. Out of 204 jurisdictions receiving summaries,[10] 193 (95%) responded with approvals; no rejections were received.

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[9] For additional information on these improvements, see Substance Abuse and Mental Health Services Administration, Office of Applied Studies. *Drug Abuse Warning Network, 2003: Interim National Estimates of Drug-Related Emergency Department Visits.* DAWN Series D-26, DHHS Publication No. (SMA) 04-3972. Rockville, MD, 2004.

[10] Only jurisdictions reporting drug-related deaths received a summary.

Geographic coverage of ME/Cs participating in DAWN

The mortality component of DAWN is not national in scope.[11] In addition, since the ME/C participants in DAWN are not part of a scientific sample, it is impossible to extrapolate from participating jurisdictions to the Nation as a whole. Similarly, it is impossible to extrapolate to an entire metropolitan area when some jurisdictions within the metropolitan area do not participate in DAWN. Therefore, careful consideration of participation is essential to avoid misinterpretations of DAWN mortality data. In this publication, participation status for each jurisdiction is a key component of each area's profile.

As part of the new design, recruitment efforts for ME/Cs are concentrated on the metropolitan areas represented in the DAWN ED component. These recruitment efforts began in 2003, but are ongoing. There are no plans, however, to make the ME/C component of DAWN national in scope. Participation in DAWN is voluntary.

In addition, selected statewide ME/C systems have been added to DAWN. Some of these include jurisdictions that are part of existing DAWN metropolitan areas; others do not. Maryland includes the Baltimore metropolitan area as well as counties in the Washington, DC, and Philadelphia metropolitan areas, and New Hampshire includes counties in the Boston metropolitan area. Maine, New Mexico, Utah, and Vermont add whole States, including rural areas that DAWN lacked previously. In addition, these three States add metropolitan areas: Portland-South Portland in Maine; Albuquerque in New Mexico; Ogden-Clearfield and Provo-Orem in Utah. States eligible for inclusion in DAWN are those with a single, centralized system. Recruitment efforts for additional eligible States are also ongoing.

[11] The mortality component of DAWN has never been national in scope.

DEFINING DRUG MISUSE AND ABUSE IN NEW DAWN

Most findings in this publication focus on two major categories of drug-related deaths, based on case type, and a third based on the drug(s) involved.

First, deaths related to **drug misuse**, defined broadly to include drug misuse or abuse, include:

- Overmedication. This category was designed to capture non-medical use, overuse, and misuse of prescription and OTC medications when this use was not documented as drug abuse.

- Homicide by drug. This category was designed to capture malicious poisonings, that is, the decedent was administered a drug by another person for a malicious purpose. Only cases assigned a manner of death of homicide by the ME/C are classified in this category.

- All other accidental. As noted previously, this category includes all cases denoted by the ME/C as natural or accidental that could not be assigned to any of the other five case types. By design, most cases of documented drug abuse will fall into this category.

- Could not be determined. As noted previously, this category includes all cases with a manner of death denoted by the ME/C as could not be determined. This manner of death is assigned by the ME/C when a definitive ruling of suicide, homicide, natural, or accidental death is not possible.

Second, findings on drug-related deaths ruled as **suicide** by the ME/C will be presented separately in this publication.

Third, findings that focus on **illicit drugs** will include all drug-related deaths related to the use of illicit drugs or inhalants, regardless of case type. For this publication, this includes deaths involving the use of drugs previously termed "major substances of abuse":

- Cocaine;
- Heroin;
- Marijuana;
- Major stimulants, including amphetamines and methamphetamine;
- Club drugs, including MDMA (Ecstasy), gamma hydroxyl butyrate (GHB), flunitrazepam (Rohypnol), and ketamine;
- Hallucinogens, including LSD, PCP, and other hallucinogens; and
- Non-pharmaceutical inhalants.

Exclusions from drug misuse and abuse

No findings are presented in this publication for the two case types that are unrelated to substance abuse or suicide:

- Adverse reaction. These cases represent the consequences of using a prescription or OTC pharmaceutical for therapeutic purposes and include deaths related to adverse drug reactions, side effects, drug-drug interactions, and drug-alcohol interactions. Adverse reactions that involve a pharmaceutical and an illicit drug are not classified in DAWN as adverse reactions.

- Accidental ingestion. This category includes cases involving the accidental use of a drug, for example, an accidental poisoning by a child or by an individual who took the wrong medication or wrong dosage by mistake. Accidental ingestion, a case type assigned in DAWN, is not synonymous with accidental deaths, a manner of death assigned by ME/Cs.

HOW TO USE THIS PUBLICATION

The general format of this publication follows that adopted in 2000. Mortality data for each metropolitan area are summarized in a 2-page "profile" for that area. Profiles for participating States appear in a separate chapter but are summarized in the same manner.

Due to changes in the content of DAWN data (e.g., the addition of cause of death) and questions from consumers of previous publications, the content of the profiles in this publication differs from that in prior years:

- Drug-related deaths are summarized in two categories: drug misuse (including drug abuse) and suicide.
- The unit of measurement in all charts and tables is deaths.
- Deaths, overall and by gender and age, are presented in a common metric: deaths per 1,000,000 population.
- The drug list has been expanded to provide more detail on pharmaceuticals.
- The most frequent drugs now focus on categories of drugs (e.g., opiates/opioids, benzodiazepines).
- No trends are presented because data from new DAWN (beginning in 2003) are not comparable to data from any prior year.
- Small numbers (defined as 3 or fewer deaths) are not shown. We do this to protect individual identities.

Content of area profiles

Figure 2 shows the general layout of each 2-page profile, with the seven component tables and figures labeled A through G.

Map and Table A

Each profile begins with a map displaying the boundaries of the metropolitan area or State and its component counties. Both participating and non-participating jurisdictions are shown, along with population size. Jurisdictions within the metropolitan area that did not provide complete data for 2003 are shaded.

A death investigation jurisdiction tends to be consistent with a county, whereas most metropolitan areas comprise multiple counties and, therefore, multiple death investigation jurisdictions. In this publication, the terms "jurisdiction" and "county" are used synonymously to reflect the fact that data are aggregated at the county level, regardless of actual

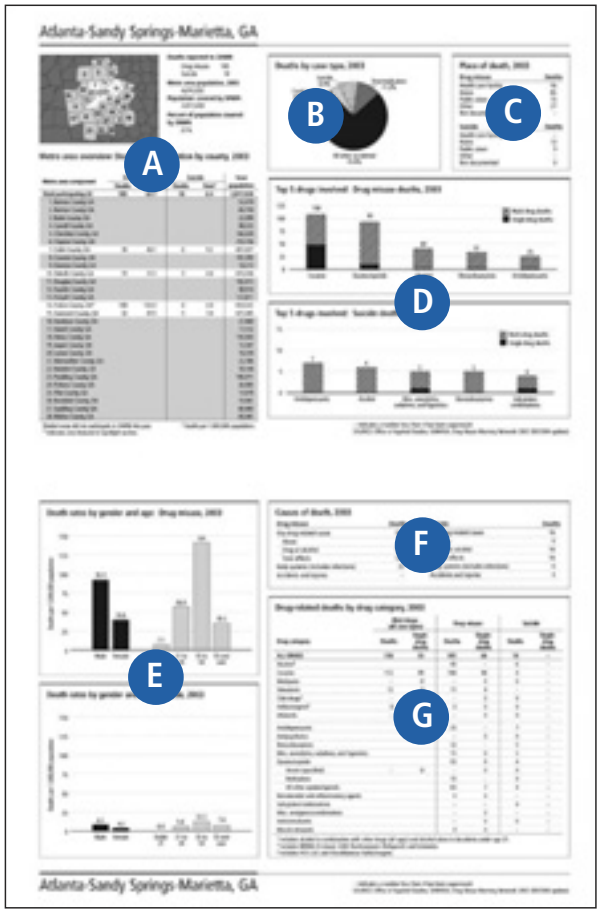

Figure 2. Sample metropolitan area profile layout

jurisdictional boundaries.[12] Metropolitan-area definitions used in this publication are those established by the Office of Management and Budget (OMB), most recently based on the 2000 decennial census.[13] These boundaries, which were updated in 2003, differ from those used in prior DAWN mortality profiles.

Also summarized are:

- The number of drug-related deaths reported by participating jurisdictions that involved drug misuse and suicide;
- The total population of the area;
- The population covered by participating jurisdictions; and
- The proportion of the population residing in participating counties.[14]

This information is consistent with that shown in Table 1 in the Highlights.

Below the map, Table A lists each of the component jurisdictions for the area, which are numbered to correspond to their location on the area map. In multi-state metropolitan areas, jurisdictions are ordered first by state and then by county. For ease of reference, rows containing non-participating areas are shaded. Jurisdictions marked with an asterisk (*) are highlighted in separate Area Spotlights. In State profiles, jurisdictions marked with an asterisk are highlighted in metropolitan-area profiles.

An overview of the area's data is displayed in the remaining columns in Table A. For each participating jurisdiction, the table divides the drug-related deaths in 2003 into those involving drug misuse and suicide and shows the actual number of deaths and the rate, i.e., the number of deaths per 1,000,000 population. The rate, because it is population-adjusted, can be compared across jurisdictions and across metropolitan areas. This standardization does not take into account, however, the differences in State laws that specify which deaths are subject to ME/C review.

The final column shows population for each jurisdiction, participating and non-participating, to make clear for readers the extent of DAWN's coverage of the metropolitan area.

The top row of the table shows totals for the area, a count of participating jurisdictions (in parentheses) and the number of deaths and death rate for all the participating jurisdictions combined.

All subsequent tables (B – G) are based on data aggregated across the participating jurisdictions in each metropolitan area or State.

12 These and other terms are defined in Appendix B.

13 Office of Management and Budget, *Revised Definitions of Metropolitan Statistical Areas, New Definitions of Micropolitan Statistical Areas and Combined Statistical Areas, and Guidance on Uses of the Statistical Definitions of These Areas*, Bulletin No. 03-04, June 6, 2003 (see http://www.whitehouse.gov/omb/bulletins/b03-04.html).

14 Population counts from U.S. Census 2000 Summary File 1 (SF-1) (see http://www.census.gov/Press-Release/www/2001/sumfile1.html). Population estimates for 2003 as of July 1, 2003 from U.S. Census Bureau County Population Dataset CO-EST2003-ALLDATA (see http://www.census.gov/popest/counties/files/CO-EST2003-alldata.csv).

Figure B

Figure B is a pie chart showing the relative mix of case types for drug misuse and suicide deaths. Solid slices are reserved for drug misuse cases; the patterned slice shows suicide deaths. Reading clockwise, the drug misuse cases include:

- Overmedication cases, in the medium blue slice to the right of suicide deaths;
- Homicide cases, in white;
- All other accidental deaths, in the darkest blue; and
- Deaths for which manner of death could not be determined, in the light blue slice.

Table C

Table C summarizes the place of death for drug misuse and suicide cases separately. Deaths in emergency departments and other health care facilities have been aggregated into the single category "health care facility."

Figure D

Separate bar charts show the 5 most common drugs reported to DAWN for drug misuse and suicide deaths. The number shown above each bar is the number of deaths reported with a drug of that type. The bars also display the proportion of cases involving single versus multiple drugs. The solid bottom portion of the bar represents deaths involving multiple drugs; the top, striped portion of the bar represents deaths involving only a single drug type. When small numbers (fewer than four deaths) are suppressed, fewer than 5 bars are shown.

The drugs for this figure have been categorized as in Table G (discussed below). The number of deaths cannot be summed across the bars, since multiple drugs are frequently involved in drug-related deaths. That is, a death that involved cocaine and heroin would appear in the bars for cocaine and for opiates/opioids. However, a death that involved multiple opiates (e.g., methadone and heroin) would be counted once in the bar for opiates/opioids and would be considered a single-drug death.

Grouping drugs in this fashion avoids the problems of de-duplicating redundant reports (e.g., "cocaine" and its metabolite "benzoylecgonine" reported for the same case), nonspecific terms (e.g., "heroin" and "opiates" reported for the same case), and drugs that may be indistinguishable (e.g., "heroin" and "morphine") given the time after death or method of testing. Enhanced training and automated prompts for DAWN reporters minimize but cannot eliminate these issues.

It is important also to remember that not every reported substance is, by itself, necessarily a cause of the death or even a contributor to the death. While improved training can reduce incidental reporting (i.e., reporting of drugs unrelated to the death), some incidental reporting will occur as a result of ambiguities in the case. In some instances, a definitive determination of which drug(s) contributed to the death may not be possible.

Figure E

Figure E displays the demographic characteristics of drug misuse and suicide deaths in terms of deaths per 1,000,000 population. Only population in participating jurisdictions is considered in calculating these rates. Taking population size into account is especially important for valid comparisons to be made across the age or gender subgroups.

Table F

Table F summarizes drug misuse and suicide deaths by selected causes of death:

- Any drug-related cause means that a cause of death explicitly implicated a drug. Drug-related causes include:
  - Abuse – A subset of drug-related causes explicitly indicating drug or substance "abuse"
  - Drug or alcohol – A subset of drug-related causes explicitly implicating a drug or alcohol.
  - Toxic effects – A subset of drug-related causes indicating adverse effects or combined effects of drugs and/or alcohol, an overdose or lethal or excess amount, poisoning, or toxicity.
- Body systems (includes infections) – A cause of death implicating a specific body system (respiratory, cardiovascular, gastrointestinal, musculoskeletal, etc.) or an infection specific to a body system.
- Accidents and injuries – A cause of death indicating involvement of an external event (such as drowning, electrocution, fall, fire, motor vehicle, gunshot wound, hanging, homicide, stabbing, suffocation, etc.).

Drug-related deaths often involve multiple causes, so deaths cannot be summed across the causes listed.

Causes of death are reported to DAWN as they appeared in text on the death certificate.[15] After receipt, each cause of death is coded and classified into categories. The categories were determined empirically, based on frequency of content and relevance to DAWN's audience. A single cause might be classified into multiple categories. For example, whether a specific drug was indicated in the cause of death was both frequent and relevant. A cause of death reported as "heroin overdose" would be classified in two categories: drug-involved (i.e., the drug was denoted in the cause of death) and overdose.

After all causes were coded and classified, the six categories listed above were selected for inclusion in Table F. As might be expected, a drug-related cause of death was present for nearly all DAWN cases.

Table G

Table G summarizes deaths involving illicit drugs, drug misuse deaths, and suicide deaths according to the drug(s) involved. For the illicit drugs, all case types, including the drug misuse and suicide deaths, are included. In fact, most of the deaths involving illicit drugs are classified either as drug misuse or suicide, but the other case types (homicide and accidental ingestion cases) also are accounted for in this one place.

The unit of measurement in this table is deaths, not drugs. The typical drug-related death reported to DAWN involves multiple drugs, so deaths cannot be summed across categories without double counting. DAWN cases include

[15] DAWN does not collect causes of death coded according to the *International Classification of Diseases, 10th Revision.*

both drug-induced and drug-related deaths. As a result, readers should not assume that any given substance was, by itself, the cause of death.

Single-drug deaths. Table G shows total deaths, followed by a column for single-drug deaths, that is, deaths involving the listed drug (or drug type) and no others. In nearly all instances, the number of deaths involving a single drug will be lower than the total number of deaths for which that drug was reported. Even in single-drug deaths, readers should not assume that the drug was necessarily the direct and sole cause of death.

Drug categories. The 17 drug categories shown in this table are unique to this publication, but they are derived from DAWN's standard drug classification scheme.[16]

The first row of the table summarizes deaths and single-drug deaths across all drug categories, those shown and those not shown in the rows below.

The next 7 rows cover alcohol and illicit drugs, except for heroin. Low frequency illicit drugs are collapsed into categories. The 7 rows include:

- Alcohol. Alcohol is reportable to DAWN for all ages if at least one other reportable substance was also present. In decedents under age 21, alcohol may be reported alone. Therefore, any single-drug death for alcohol is for a decedent under age 21. Alcohol is not included among the illicit drugs, although it is an illegal drug for individuals under age 21.
- Cocaine. This category includes both crack and powder cocaine.
- Marijuana. This category includes marijuana and hashish. Importantly, some jurisdictions do not conduct toxicology tests for the presence of marijuana and do not report marijuana to DAWN. The full extent of the under-reporting of marijuana is unknown.
- Stimulants. This category includes amphetamines and methamphetamine. It does not include other central nervous system stimulants, such as caffeine or methylphenidate.
- Club drugs. This category is included because of the recent interest in the group of substances commonly known as "designer" or "club drugs." However, due to small numbers, these substances are aggregated into a single category for this table. In this publication, this category includes methylenedioxymethamphetamine (MDMA or Ecstasy); gamma hydroxy butyrate (GHB) and its precursor gamma butyrolactone (GBL); flunitrazepam (Rohypnol); and ketamine. Readers should note that, in other settings, the definition of club drugs may exclude some of these drugs or include others such as LSD or methamphetamine. Therefore, caution is advised when comparing findings from this table with findings from other sources.
- Hallucinogens. This category includes LSD, PCP, and miscellaneous hallucinogens such as psilocybin.
- Inhalants. This category includes anesthetic gases and any other psychoactive non-pharmaceutical substance for which the documented route of administration was inhalation.

[16] Additional information about the drugs included in each category is available online at http://DAWNinfo.samhsa.gov/ and in Substance Abuse and Mental Health Services Administration, Office of Applied Studies. *Emergency Department Trends From DAWN: Preliminary Estimates January-June 2001 with Revised Estimates 1994-2000.* DAWN Series D-20, DHHS Publication No. (SMA) 02-3634, Rockville, MD, 2001. The classification of drugs in use by DAWN is derived from the Multum *Lexicon*, Copyright© 2004, Multum Information Services, Inc. The classification has been modified to meet DAWN's unique requirements (2004). The Multum Licensing Agreement governing use of the *Lexicon* is provided in Appendix C and can be found on the Internet at http://www.multum.com/.

The following rows are devoted to prescription and OTC pharmaceuticals as well as heroin, which is listed with the other opiates/opioids. The categories highlighted in this table are:

- Antidepressants, which include monoamine oxidase inhibitors (MAOIs), selective serotonin reuptake inhibitors (SSRIs), tricyclic antidepressants, and miscellaneous antidepressants such as bupropion and venlafaxine.
- Antipsychotics, which include phenothiazine antipsychotics, psychotherapeutic combinations, thioxanthenes, and miscellaneous psychotic agents such as lithium and quetiapine.
- Benzodiazepines, which include alprazolam, clonazepam, diazepam, and others, including those reported simply as "benzodiazepines." Flunitrazepam, which is classified as a club drug, is not included as a benzodiazepine.
- Miscellaneous anxiolytics, sedatives, and hypnotics, which include diphenhydramine and zolpidem.
- Opiates/opioids, which include all types of natural and synthetic opiates and opioid analgesics. This is the only category that is subdivided. The subdivisions are **heroin (specified)**, which means heroin reported by name or its specific metabolites;[17] **methadone**; and all other **opiates/opioids**, which include natural and synthetic opiates and opioid analgesics such as codeine, hydrocodone, oxycodone, and morphine, as well as reports designated simply as "opiates."[18]
- Nonsteroidal anti-inflammatory agents (NSAIDs), which include ibuprofen and naproxen. Cox-2 inhibitors are not classified as NSAIDs in the taxonomy used by DAWN.
- Salicylates/combinations, which include aspirins alone and in combination with other ingredients.
- Miscellaneous analgesics/combinations, which are primarily acetaminophen alone or in combination with other ingredients.
- Anticonvulsants, which include carbamazepine and gabapentin.
- Muscle relaxants, which include carisoprodol and cyclobenzaprine.

Readers should note that the total number of deaths in any given drug category (with the exception of alcohol, cocaine, and heroin) is often quite small, even in metropolitan areas with a relatively large number of drug misuse and abuse deaths. The presentation of these data, despite their low frequency, represents a deliberate effort to provide useful information about the relative occurrence of deaths related to different types of substances. However, numbers less than 4 have been suppressed to protect decedent identities.

[17] Overall, nearly 90% of the category "heroin (specified)" were reported to DAWN as "heroin" or its metabolite "monoacetylmorphine." The remaining 10% were reported as acetylmorphine, diacetylmorphine, acetylcodeine, black tar heroin, or heroin dope. Morphine and unspecified opiates are **not** included in this "heroin (specified)" category. Morphine is not classified as heroin because it is not possible to differentiate morphine, the metabolite of heroin, from morphine itself Overall, the term "morphine" accounted for 98% of reports classified as morphine, and the term "opiates" accounted for 99% of the unspecified opiates.

[18] Some examples may assist readers in interpreting this classification. A death that involved heroin and methadone would be counted once in the "opiates/opioids" category, once in the "heroin (specified)" row, and once in the "methadone" row. A death that involved morphine (prescription morphine or the metabolite for heroin) would be counted in the "opiates/opioids" category and in the row for "all other opiates/opioids." A death that involved morphine and codeine (a possible indicator for heroin) would be counted once in the "opiates/opioids" category and once in the row for "all other opiates/opioids."

State profiles

DAWN began to add statewide medical examiner/coroner systems in 2003. Any State that has a single source for its ME/C cases is a candidate for DAWN. Each participating State is profiled in a separate section of this publication, using tables and figures identical in content to those for metropolitan areas. For example, Table A in a State profile includes all the counties in that State. In 2003, State profiles are available for:

- Maine;
- Maryland;
- New Hampshire;
- New Mexico;
- Utah; and
- Vermont.

Metropolitan areas in these States can be found in the metropolitan area profiles in this publication. Only metropolitan areas that fell wholly within the State and reported more than 30 drug misuse or suicide deaths to DAWN in 2003 are profiled. In 2003, these are:

- Portland-South Portland, ME;
- Baltimore, MD;
- Albuquerque, NM; and
- Ogden-Clearfield, Provo-Orem, and Salt Lake City, UT.

Abbreviated profiles for areas with few drug-related deaths

Abbreviated profiles are provided for metropolitan areas with too few cases to produce all the tables and figures described above. To warrant a full 2-page profile for a given metropolitan area, all participating jurisdictions in the area must have reported at least 30 drug misuse or suicide deaths in the reporting year. In 2003, three areas warranted abbreviated profiles:

- Dallas-Fort Worth-Arlington, TX, with only one jurisdiction (Collin County) participating in DAWN in 2003;
- Fargo, ND-MN; and
- Sioux Falls, SD.

For these areas, we provide only a map and Table A. This allows us to show the specific counties included in the metropolitan area, the population of each, the identities of those component jurisdictions that participated in DAWN in 2003, and the number of deaths involving drug misuse or suicide that were reported by each participating jurisdiction. If the number of participating jurisdictions or reported deaths increases in future years to exceed 30, then full 2-page profiles will be provided for these areas. Likewise, if any area drops below the 30-case threshold in future years, only a map and Table A will be published for that area.

Area spotlights

Area spotlights focus on drug misuse deaths in key counties and/or cities within the participating metropolitan areas. As a general rule, spotlight pages are indicated for jurisdictions in which 60 or more misuse deaths were reported. These usually correspond to population centers of a metropolitan area and/or the county containing the city for which the metropolitan area is named. Spotlight pages are not produced for population centers when fewer than 60 misuse deaths were reported. Suicide deaths are not covered in spotlight pages because the numbers so rarely exceeded the 60-death threshold.

The following examples and exceptions apply:

- Albuquerque. We spotlight Bernalillo County in the Albuquerque metropolitan area because it is both the major population center and contains the city of Albuquerque. This is the pattern followed for most metropolitan area spotlights.

In a few metropolitan areas, we spotlight multiple counties when their large populations and/or local interest warrant separate listings. These include the following:

- Baltimore. We spotlight both Baltimore City and Baltimore County.
- Boston. We spotlight Essex, Middlesex, and Suffolk Counties.
- Detroit. We spotlight Oakland and Wayne Counties.
- New Orleans. We spotlight both Jefferson and Orleans Parish.
- New York-Newark-Edison. For New York City, we spotlight Bronx, Kings, New York, and Queens Counties. Richmond County had too few deaths to spotlight. For the metropolitan area, we also spotlight Suffolk County, NY.
- Philadelphia. We spotlight Delaware and Montgomery Counties in Pennsylvania.
- Seattle. We spotlight King and Snohomish Counties.
- St. Louis. We spotlight both St. Louis City and St. Louis County.

For some metropolitan areas, no spotlight pages are necessary because the metropolitan area contains only one county or had only one county participating in DAWN. This occurred in the following areas:

- The San Diego metropolitan area contains only one county. Because deaths are reported to DAWN at the county level, there are no sub-areas that can be presented separately for San Diego.
- Seven metropolitan areas contain multiple counties, only one of which participated in DAWN in 2003. Thus, there are no additional areas for spotlights in: Birmingham, Cleveland, Louisville, Miami, Milwaukee, Oklahoma City, and Phoenix. In addition, two counties in Indianapolis participated in DAWN in 2003, but only one reported drug-related deaths.

Unfortunately, in a few metropolitan areas the jurisdictions representing the population centers did not participate in DAWN in 2003. Therefore, spotlights were not possible for:

- Cook County in Chicago.
- Dallas County in Dallas.
- Philadelphia County in Philadelphia.
- San Francisco County in San Francisco.

Content of area spotlight reports

Spotlights profile individual jurisdictions in essentially the same format as the full metropolitan area profiles. The map shows only the spotlighted area relative to the rest of the metropolitan area and summary counts of drug misuse deaths, suicide deaths, county population, and death rates pertain only to the spotlighted jurisdiction. These, of course, match the counts and rates shown in the full profiles for the relevant jurisdiction.

Spotlights also include Figure B, Table C, Figures D and E, and Tables F and G, which are interpreted as described above. Because of the small numbers involved, suicide deaths have been removed from all but the jurisdiction summary and Figure B.

DAWN PARTICIPATION IN 2003

For 2003, 126 jurisdictions in 35 metropolitan areas submitted mortality data to DAWN (Table 1).[19] Mortality data for 2003 also include 6 States with a total of 126 jurisdictions. These States contributed 30 of the metropolitan area jurisdictions. To be eligible for inclusion, each jurisdiction must have submitted data for at least 10 months of the data year.[20] Cases pending (i.e., incomplete) at the end of the data collection period are excluded.[21] As noted previously, metropolitan area definitions used in DAWN are those established by the OMB, based on the 2000 decennial census.

Among the 35 metropolitan areas, 32 reported more than 30 deaths related to drug misuse, and 13 of the 32 areas reported more than 30 drug-related suicide deaths. Full 2-page profiles of drug misuse and drug-related suicide deaths are provided for each of the 32 areas, and they are the focus of the metropolitan highlights. Abbreviated profiles are provided for 3 metropolitan areas.

An awareness of the extent of DAWN's coverage within a given area is important to gain an accurate perspective on what DAWN represents. Table 1 lists the metropolitan areas and States represented in DAWN, the total number of death investigation jurisdictions (counties) in each area, the number and percentage of eligible counties for which mortality data were reported to DAWN, and the proportion of the area's total population that is covered by DAWN-participating jurisdictions (counties). Information on population coverage is important because it shows that, although jurisdiction coverage is incomplete in many areas, the most populous counties within a given MSA are often represented. For example, Table 1 shows that although only 4 (14%) of the 27 counties in the Atlanta metropolitan area participated in DAWN in 2003, those 4 counties are home to 61% of the area's total population.

Among the metropolitan areas, the overall response rate of 44% varied from 8% in Louisville and Dallas-Fort Worth-Arlington to 100% in 9 metropolitan areas (Table 1). Population coverage exceeded 90% in 13 metropolitan areas. Notably absent from the 2003 mortality data are:

- Cook County in Chicago.
- Dallas County in Dallas.
- Nassau and Westchester Counties, two of the largest of the suburban counties in metropolitan New York.
- Most of the New Jersey counties now included in the New York-Newark-Edison metropolitan area. The most populous of these include Bergen, Essex, and Middlesex Counties.
- Philadelphia County in Philadelphia.
- San Francisco County in San Francisco. Also, Alameda and Contra Costa Counties, two of the largest counties in the expanded San Francisco-Oakland metropolitan area.
- Both Los Angeles and Orange Counties, which comprise the Los Angeles metropolitan area.

[19] For comparability across metropolitan areas, the four districts that make up Niagara County, NY, are counted as one jurisdiction.

[20] Data for 2 jurisdictions covered less than 10 months and were excluded.

[21] Some drug-related deaths are reported to DAWN some time after the death occurred. Reporting delays are common because death investigations can be lengthy and involved. Reporters may have to await the results of autopsies and laboratory tests to determine that a death involved drugs. This publication was prepared with data for deaths that occurred in 2003, which were submitted by the end of June 2004.